

**South Pacific coast region.**—11th, 24th, 25th, 27th.

In the Southern states frosts were reported as follows:

**Alabama.**—Green Springs, 2d, 15th; Mobile, 1st; Montgomery, 10th, 16th.

**Arkansas.**—Mount Ida, 2d, 3d, 4th, 9th, 12th, 13th, 15th, 20th; Lead Hill, 3d, 9th, 12th to 15th, 20th; Little Rock, 2d, 9th; Fort Smith, 9th, 15th.

**Florida.**—Newport and Pensacola, 1st; Archer and Li-mona, 3d.

**Georgia.**—Augusta, 1st, 2d, 10th; Atlanta, 1st, 10th, 15th; Milledgeville, 10th, 15th; Andersonville, 13th, 14th, 27th.

**North Carolina.**—Weldon, 1st, 16th, 31st; Chapel Hill, 1st, 10th, 16th, 17th; Brevard, 1st to 5th, 10th, 15th, 16th, 17th, 21st, 26th, 30th, 31st; Ogleeta, 10th, 15th, 16th, 31st; Smithville, 16th, 31st; Fort Macon, 1st, 16th; Hatteras and Wilmington, 1st, 4th; Charlotte, 1st to 5th, 10th, 15th, 16th.

**South Carolina.**—Stateburg, 3d, 10th, 15th, 16th.

**Tennessee.**—Knoxville, 1st, 4th, 10th, 15th, 16th; Chattanooga, 1st to 5th, 10th, 15th, 16th; Memphis, 1st to 11th, 15th; Austin, 15th, 16th, 17th; Milan, 10th, 12th, 15th.

**Texas.**—Cleburne, 2d, 9th; Austin, Clarksville, and Palestine, 9th; Fort Davis, 19th; Fort Stockton, 25th.

On the summit of Mount Washington frosts occurred on the 1st, 3d to 13th, 16th to 20th, 22d to 31st.

The following cases of injury to vegetation by frost have been reported:

**Indianola, Texas.**—The fruit trees and garden vegetables in this vicinity were injured by the cold weather on the 1st.

**Knoxville, Tennessee, 10th.**—The severe weather of the past week caused injury to all kinds of fruit.

#### ICE.

Under the heading "ice in rivers and harbors" the subject of ice formation in the northern section of the country is considered. In the Southern states the following cases of ice formation have been reported:

**Arkansas.**—Lead Hill, 2d to 9th, 12th to 15th.

**North Carolina.**—Charlotte, 1st; Weldon, 31st.

**Texas.**—Indianola, 1st; El Paso, 1st, 28th.

#### PRECIPITATION.

[Expressed in inches and hundredths.]

In the first column of the following table is shown the average precipitation for March in each of the various districts for several years, as determined from observations made at the Signal Service stations; in the second column are given the averages for March, 1884; and the third column shows the excess or deficiency of March, 1884, as compared with the average.

Average precipitation for March, 1884.

Districts.	Average for March. Signal-Service ob- servations.		Comparison of March, 1884, with the av- erage for sev- eral years.
	For sev- eral years.	For 1884.	
	Inches.	Inches.	
New England.....	4.45	5.04	0.59 excess.
Middle Atlantic states.....	4.21	6.02	1.81 excess.
South Atlantic states.....	5.26	5.98	0.72 excess.
Florida peninsula.....	3.36	1.67	1.69 deficiency.
Eastern Gulf states.....	6.24	9.03	2.79 excess.
Western Gulf states.....	4.21	4.83	0.62 excess.
Rio Grande valley.....	1.10	0.12	0.98 deficiency.
Tennessee.....	5.97	9.07	3.10 excess.
Ohio valley.....	3.85	3.48	0.37 deficiency.
Lower lake region.....	2.82	2.78	0.04 deficiency.
Upper lake region.....	2.40	2.16	0.24 deficiency.
Extreme northwest.....	1.24	0.69	0.55 deficiency.
Upper Mississippi valley.....	2.45	2.90	0.45 excess.
Missouri valley.....	1.48	2.65	1.17 excess.
Northern slope.....	0.54	1.00	0.46 excess.
Middle slope.....	0.01	1.06	0.45 excess.
Southern slope.....	0.72	0.39	0.33 deficiency.
Southern plateau.....	0.82	3.20	2.44 excess.
Northern plateau.....	1.61	1.94	0.33 excess.
North Pacific coast region.....	5.82	2.40	3.42 deficiency.
Middle Pacific coast region.....	2.98	8.06	5.08 excess.
South Pacific coast region.....	0.84	6.69	5.85 excess.
Mount Washington, N. H.....	6.97	4.16	2.81 deficiency.
Pike's Peak, Colo.....	2.16	0.39	1.77 deficiency.
Salt Lake City, Utah.....	1.98	3.09	1.71 excess.

The distribution of rainfall over the United States and Canada, as determined from the reports from more than six hundred stations, is exhibited on chart iv.

In the lower lake region the precipitation for the month was normal. In the upper lake region, extreme northwest, Florida peninsula, southern slope, Rio Grande and Ohio valleys, deficiencies occurred, ranging from 0.24 to 1.69. The average precipitation in the north-Pacific coast region was 2.40, which is considerably less than half of the March average for that district. With these exceptions, the monthly precipitation in the United States was in excess of the average. In California and the southern plateau it was about four times as great as the average for March. Large excesses also occurred in Tennessee, the middle Atlantic and eastern Gulf states. In the Missouri valley the precipitation exceeded the average by 1.17, and in the other districts, where excesses are shown, they were less than 1.00, except at Salt Lake City, Utah, where it amounted to 1.71.

#### DEVIATIONS FROM AVERAGE PRECIPITATION.

The departures exhibited by the reports from the regular Signal Service stations, are shown in the table of average precipitation for March, 1884. Voluntary observers report the following notes in connection with this subject:

**Arkansas.**—Lead Hill, Boone county: monthly precipitation, 3.95, is 0.43 above the March average of the last two years.

**California.**—Fall Brook, San Diego county: monthly precipitation, 10.90, is the heaviest during March for the last eight years.

**Illinois.**—Anna, Union county: monthly precipitation, 4.05, is 0.20 below the March average of the last nine years. The largest March precipitation of that period, 8.82, occurred in 1876; the smallest, 1.99, occurred in 1881.

Riley, McHenry county: monthly precipitation, 1.51, is 1.16 below the March average of the last twenty-three years.

Mattoon, Coles county: monthly precipitation, 2.75, is 0.97 below the March average of the five preceding years.

Swanwick, Perry county: monthly precipitation, 2.75, is 0.86 below the March average of the two preceding years.

**Indiana.**—Wabash, Wabash county: monthly precipitation, 2.05, is 1.01 below the March average of the last eight years.

Logansport, Cass county: monthly precipitation, 4.02, is 0.58 above the March average of the last twenty-five years.

Vevay, Switzerland county: monthly precipitation, 1.37, is 2.66 below the average of March for a period of twenty years.

**Kansas.**—Yates Centre, Woodson county: monthly precipitation, 1.09, is 0.27 below the March average of the last four years.

Wellington, Sumner county: monthly precipitation, 1.02, is 0.20 below the March average of the last five years.

Independence, Montgomery county: monthly precipitation, 1.00, is 1.20 below the March average of the last twelve years.

Lawrence, Douglas county: monthly precipitation, 2.73, is 0.55 above the March average of a period of seventeen years.

**Maine.**—Gardiner, Kennebec county: monthly precipitation, 5.40, is 1.44 above the March average of a period of forty-eight years.

**Maryland.**—Fallston, Harford county: monthly precipitation, 5.71, is 1.33 above the March average of the last thirteen years. The precipitation for the three months ending March 31, 1884, is 16.88, or 5.36 above the average of the corresponding period of the last thirteen years.

**Massachusetts.**—Worcester, Worcester county: monthly precipitation, 2.37, is 1.15 below the March average of the last forty-five years. The largest March precipitation of that period, 7.71, occurred in 1859; the smallest, 0.23, occurred in 1854.

**Missouri.**—Saint Louis: monthly precipitation, 3.63, is 0.74 below the normal for a period of forty-seven years.

**New Hampshire.**—Contoocook, Merrimac county: monthly precipitation, 4.20, is 0.75 above the March average of the last twenty years.

Table of excessive, and greatest and least monthly precipitation.

Station.	Specially heavy.			Largest monthly.	Smallest monthly.	
	Date.	Amt.	Duration	Amount.	Station.	Amt.
<i>Alabama.</i>						
Mount Vernon Barracks...	7, 8	2.20		14.68		
Do.....	11, 12, 13	2.84				
Do.....	17, 18, 19	6.09				
Do.....	22, 23, 24	3.43				
Clanton.....				12.75		
Pineapple.....				12.30		
Mobile.....	12, 13	3.87		11.53		
Do.....	17, 18	4.50				
Auburn.....				10.07		
Montgomery.....	12, 13	2.07		9.50		
Do.....	18, 19	2.01				
Do.....	23, 24	3.24				
Green Springs.....	7	2.57		9.17		
Tuscaloosa.....				9.02		
Demopolis.....				7.99		
<i>Arizona.</i>						
Fort Grant.....	4	2.08				
<i>California.</i>						
Emigrant Gap.....				15.18		
Cisco.....				14.65		
Los Angeles.....	3, 4, 5	5.73		12.36		
Do.....	9	2.67				
Colfax.....				12.27		
Knoxville.....				11.72		
Fall Brook.....	9, 10	1.71		10.90		
Do.....	28, 29	2.05				
San Fernando.....				10.51		
Auburn.....				10.17		
Calistoga.....				9.76		
Newhall.....				9.73		
Summit.....				9.10		
Santa Cruz.....				8.76		
Oakland.....				8.59		
San Francisco.....	8, 9	3.33		8.24		
Sacramento.....	8, 9	3.44		8.14		
Martinez.....				7.97		
Benicia Barracks.....	9	2.44		7.83		
Ione.....				7.82		
Angel Island.....	9	3.04		7.82		
Red Bluff.....	8, 9	2.24		7.81		
Do.....	27, 28	2.00				
Hydesville.....	9, 10	1.75		7.03		
Spadra.....				7.00		
Anaheim.....				6.70		
Fort Bidwell.....				6.57		
Farmington.....				6.53		
Pleasanton.....				6.53		
San Mateo.....				6.38		
Suisun.....				6.38		
San Diego.....	14, 15	1.64		6.23		
San Jose.....				6.23		
Monterey.....				6.08		
Ravenna.....				6.06		
South Valley.....				6.06		
Alcatraz Island.....	9	2.33		6.02		
Presidio of San Francisco.....	8, 9	2.30				
Weaverville.....	8, 9	1.99				
College City.....	8, 9	1.92				
<i>Delaware.</i>						
Saint George's.....	7, 8, 9	4.40		12.20		
Do.....	19, 20	4.10				
<i>Delaware Breakwater.</i>						
<i>District of Columbia.</i>						
Washington City.....	19, 20	2.20		7.24		
Distributing Reservoir.....				7.00		
West Washington.....				6.50		
<i>Florida.</i>						
Fort Barrancas.....	12, 13	4.20		6.25		
Pensacola.....	12, 13	4.04				
<i>Georgia.</i>						
Forsyth.....	12, 13	3.21		11.93		
Do.....	22, 23, 24	4.10				
Atlanta.....	7, 8	2.17		9.70		
Do.....	12, 13	2.19				
Do.....	18, 19	2.39				
Milledgeville.....	13	2.80		8.82		
Do.....	24	2.60	6 hours			
Andersonville.....	13, 15	4.16		7.52		
Do.....	23, 24	2.04				
Augusta.....				6.97		
Quitman.....	13	2.00				
<i>Illinois.</i>						
Chicago.....	25, 26	3.26	22 hours			
Cairo.....	5	1.91				
<i>Kansas.</i>						
West Leavenworth.....				6.30		
<i>Louisiana.</i>						
Grand Coteau.....	17, 18, 19	5.33		10.20		
New Orleans.....	17, 18	3.45		8.24		
<i>Maryland.</i>						
Woodstock.....				7.65		
Receiving Reservoir.....				6.69		
Baltimore.....				6.37		
<i>Massachusetts.</i>						
Princeton.....				6.91		
Provincetown.....	26	2.14		6.77		
<i>Mississippi.</i>						
Vicksburg.....	17, 18	2.29		8.29		
<i>Missouri.</i>						
Jefferson Barracks.....	24, 25	2.20				
<i>Nebraska.</i>						
Marquette.....				6.04		
<i>New Jersey.</i>						
Vineland.....				6.59		
Atlantic City.....	14, 15	2.07				

Table of excessive, and greatest and least monthly precipitation.—Continued.

Station.	Specially heavy.			Largest monthly.	Smallest monthly.	
	Date.	Amt.	Duration	Amount.	Station.	Amt.
<i>New York.</i>						
Dannemora.....				8.86		
Factoryville.....	9	2.20				
<i>North Carolina.</i>						
Brevard.....	18, 19	7.10		14.53		
Highlands.....	18, 19	5.50		13.55		
Statesville.....				12.03		
Lenoir.....	18	3.00		9.40		
Charlotte.....	24, 25	2.42		9.19		
Kitty Hawk.....				9.17		
Weldon.....				7.06		
Chapel Hill.....				6.20		
Wilmington.....	25, 26	3.53		6.07		
<i>North Carolina.</i>						
<i>Ohio.</i>						
Halifax.....				7.04		
<i>Pennsylvania.</i>						
West Chester.....				6.69		
<i>Rhode Island.</i>						
Block Island.....				6.40		
<i>South Carolina.</i>						
Aiken.....				7.16		
<i>Tennessee.</i>						
Smithville.....				14.90		
Knoxville.....	5, 6, 7	4.82		11.93		
Do.....	25	2.32				
Chattanooga.....	5, 6, 7	4.57		10.19		
Austin.....				8.25		
Ashwood.....				6.10		
Fortoria.....	5	3.50				
Kingston Springs.....	25	1.07	30 min.			
<i>Texas.</i>						
Leburne.....	23	2.25		6.25		
Galveston.....	17, 18	3.04				
Palestine.....	17	2.21				
<i>Virginia.</i>						
Norfolk.....				9.13		
Variety Mills.....	25, 26	2.07		8.78		
Johnsontown.....				8.75		
Lynchburg.....				8.14		
Wytheville.....	19, 20	2.94		8.04		
Chincoteague.....				7.81		
Cape Henry.....				7.65		
Fort Myer.....				7.52		
Marion.....				6.70		
Fort Monroe.....				6.53		

*New York.*—Palermo, Oswego county: monthly precipitation, 3.23, is 0.33 above the March average of the last thirty-one years.

*North Volney,* Oswego county: monthly precipitation, 3.90, is 0.68 above the average of the last twelve years.

*Dannemora,* Clinton county: monthly precipitation, 8.86, is 5.24 in excess of the March average of the last four years.

*Cooperstown,* Otsego county: monthly precipitation, 4.48, is the largest occurring during March for the last twelve years.

*Ohio.*—Wauseon, Fulton county: monthly precipitation, 2.78, is 0.57 below the March average of the last eleven years. The largest March precipitation of that period, 6.52, occurred in 1876; the smallest, 0.97, occurred in 1872.

*Pennsylvania.*—Dyberry, Wayne county: monthly precipitation, 3.93, is 0.78 above the March average of the last sixteen years. The largest March precipitation of that period, 5.78, occurred in 1871; the smallest, 1.55, occurred in 1883.

*Texas.*—New Ulm, Austin county: monthly precipitation, 4.86, is 0.77 below the March average of the last twelve years. The largest March precipitation of that period, 13.13, occurred in 1883; the smallest 2.25 occurred in 1878.

*Vermont.*—Woodstock, Windsor county: monthly precipitation, 4.48, is 1.29 above the March average of the last fifteen years.

*Virginia.*—Wytheville, Wythe county: monthly precipitation, 8.04, is 4.29 above the March normal of a period of twenty years.

*Variety Mills,* Nelson county: monthly precipitation, 8.78, is 5.32 in excess of the March average of the last five years. The total precipitation for the three months ending March 31, 1884, is 20.39, or 10.04 above the average of the corresponding period of the last five years.

*Washington Territory.*—Bainbridge Island: monthly precipitation, 0.97, is the smallest March precipitation of the last seven years.

*West Virginia.*—Helvetia, Randolph county: monthly precipitation, 4.96, is 0.06 below the average of the last eight years.

Table of rainy and cloudy days, relative humidity, and dew-point for Mar., 1884.

Districts.	† Rainy days.	‡ Cloudy days.	Rel. humidity. *	Dew-point.
			Percentages.	
	From 16 to 22	From 8 to 14	From 73.4 to 80.0	From 21.2 to 30.1
New England.....	" 15 " 21	" 7 " 15	" 95.0 " 84.1	" 25.5 " 41.4
Middle Atlantic states.....	" 11 " 19	" 5 " 11	" 68.3 " 79.3	" 41.2 " 50.2
South Atlantic states.....	" 5 " 10	" 1 " 3	" 72.9 " 73.9	" 58.6 " 68.2
Florida peninsula.....	" 10 " 15	" 10 " 12	" 63.0 " 78.5	" 45.9 " 58.1
East Gulf states.....	" 10 " 18	" 8 " 13	" 63.1 " 80.0	" 38.2 " 58.6
West Gulf states.....	" 2 " 9	" 6 " 13	" 62.6 " 80.4	" 56.2 " 62.1
Rio Grande valley.....	" 16 " 23	" 14 " 18	" 63.4 " 74.7	" 28.4 " 35.2
Ohio valley.....	" 16 " 19	" 10 " 15	" 62.8 " 71.6	" 38.4 " 40.8
Tennessee.....	" 16 " 21	" 8 " 16	" 72.1 " 78.9	" 23.4 " 27.5
Lower lake region.....	" 10 " 23	" 6 " 17	" 67.1 " 79.7	" 12.9 " 25.2
Upper lake region.....	" 5 " 10	" 4 " 7	" 78.5 " 85.0	" 5.8 " 14.9
Extreme northwest.....	" 11 " 20	" 7 " 15	" 63.7 " 73.9	" 17.8 " 36.7
Upper Mississippi valley.....	" 15 " 17	" 8 " 11	" 67.3 " 78.3	" 19.7 " 39.1
Missouri valley.....	" 6 " 11	" 4 " 12	" 48.5 " 81.1	" 9.6 " 26.5
Northern slope.....	" 3 " 8	" 5 " 4	" 52.8 " 88.9	" 19.2 " 26.2
Middle slope.....	" 3 " 7	" 5 " 9	" 47.4 " 56.3	" 33.5 " 38.8
Southern slope.....	" 6 " 14	" 3 " 10	" 39.8 " 71.9	" 24.4 " 37.8
Southern plateau.....	" 9 " 20	" 7 " 11	" 74.1 " 83.2	" 29.6 " 33.4
Northern plateau.....	" 13 " 19	" 8 " 14	" 73.0 " 79.9	" 41.1 " 47.1
North Pacific coast region.....	" 9 " 21	" 7 " 11	" 50.3 " 76.0	" 3.19 " 49.3
Middle Pacific coast region.....	" 9 " 21	" 7 " 11	" 50.3 " 76.0	" 3.19 " 49.3
South Pacific coast region.....	" 9 " 21	" 7 " 11	" 50.3 " 76.0	" 3.19 " 49.3
Mt. Washington, N. H.....	Twenty	Six	86.1	8.6
Pike's Peak, Colo.....	Eleven	Eight	76.9	— 0.9
Salt Lake City, Utah.....	Seventeen	Fourteen	58.6	27.0

\* Relative humidity corrected for altitude. † Including all days on which rain or snow fell. ‡ Including all cloudy days—with or without rain or snow.

## SNOW.

Snow fell in the northern and western districts as follows:

*New England.*—2d to 12th, 14th to 17th, 19th to 21st, 28th, 30th, 31st.

*Middle Atlantic states.*—1st to 10th, 13th to 16th, 20th.

*Ohio valley.*—1st to 10th, 14th, 15th.

*Lower lake region.*—1st to 11th, 14th to 21st, 28th to 30th.

*Upper lake region.*—1st to 12th, 14th to 17th, 19th, 20th, 22d, 29th to 31st.

*Extreme northwest.*—1st to 6th, 9th to 12th, 14th, 15th, 18th, 20th to 22d, 27th to 29th, 31st.

*Upper Mississippi valley.*—1st to 12th, 18th to 20th, 30th.

*Missouri valley.*—1st to 14th, 18th to 22d, 31st.

*Northern slope.*—1st to 12th, 18th to 23d, 26th to 31st.

*Middle slope.*—1st to 3d, 5th to 8th, 10th, 11th, 16th to 18th, 20th, 21st, 23d, 24th, 31st.

*Southern plateau.*—15th, 23d, 24th, 26th, 27th, 29th to 31st.

*Middle plateau.*—4th to 12th, 15th, 16th, 18th to 31st.

*Northern plateau.*—5th, 9th to 12th, 15th, 19th, 25th to 27th.

*North Pacific coast region.*—5th to 10th, 18th, 19th, 22d, 25th, 27th, 29th.

In the Southern states snow is reported to have fallen as follows:

*Arkansas.*—Lead Hill, 7th, 8th; Fayetteville and Fort Smith, 8th.

*California.*—Hydesville, 27th; Red Bluff, 22d, 28th.

*Georgia.*—Atlanta, 1st, 2d.

*New Mexico.*—Fort Stanton, 23d.

*North Carolina.*—Brevard, Highlands, Lenoir, Ogleeta, and Charlotte, 1st; Wash Woods, 5th.

*Tennessee.*—Milan, 1st, 2d, 17th; Chattanooga and Knoxville, 1st, 2d; Memphis, 4th.

Snow storms of unusual severity, impeding railroad travel, etc., have been reported as follows:

*Huron, Dakota:* the railroads to the eastward were blockaded with snow on the 1st, 2d and 3d.

*Saint Paul, Minnesota:* nearly all trains arriving here on the 2d, were delayed on account of snow drifts. On the 10th, trains on all railroads centering here were delayed from two to eight hours. Snow plows were in general use on the 11th. Delay of trains continued on the 12th and 13th.

*Fort Totten, Dakota:* on the 5th, trains arrived and departed on schedule time, the railroads having been blockaded with snow since February 26th. Railroad traffic was also interrupted by snow blockades from March 10th to 17th.

*Denver, Colorado:* the snow storm of the 5th and 6th, blockaded the Denver and Rio Grande railroad. On the latter date the snow was from three to five feet deep on the range near Cumbres, Conejos county.

*Salt Lake City, Utah:* the snow-storm of the 5th and 6th delayed trains on the Union Pacific railroad for six hours.

*Oswego, New York:* snow fell to a depth of nearly twelve inches on the 9th, causing delay of trains.

*Cedar Rapids, Iowa:* trains on the Milwaukee division of the Burlington, Cedar Rapids and Northern railroad were abandoned on the 10th on account of snow-drifts.

*Eastport, Maine:* a heavy snow-storm occurred on the 10th. The high winds caused the snow to drift to such an extent as to seriously impede travel.

*Portland, Maine:* the snow-storm ending on the morning of the 10th was one of the heaviest of the winter. All railways were badly blockaded and travel seriously impeded.

*La Crosse, Wisconsin:* on the 11th the railroads to the west and north were blockaded with snow.

*Cheyenne, Wyoming:* a violent snow-storm prevailed on the 21st, the snow drifting to a depth of seven feet in this city. Trains on the Union Pacific railroad were delayed.

*Montreal, Province of Quebec, Canada:* on the 21st it was reported that no trains had passed over the Canadian Pacific railroad for eighteen days on account of snow drifts.

*Webster, Day county, Dakota:* the Chicago, Milwaukee and Saint Paul railroad was blockaded with snow nearly the entire month, only one train having arrived between the 1st and 22d.

*Silver Cliff, Custer county, Colorado:* a violent snow storm prevailed on the 24th and 25th; on the latter date the snow was two feet deep on the level.

## LARGEST MONTHLY SNOW-FALLS.

[Expressed in inches and tenths.]

The following are the largest monthly snow-falls reported from the various states and territories during the month:

*California.*—Summit, 91; Emigrant Gap, 64; Cisco, 58; Truckee, 44.5; Boca, 22; Alta, 15; Colfax, 7.5; Weaverville, 5.

*Colorado.*—Gunnison, 21; Fort Collins, 11.5; Denver, 9.3.

*Dakota.*—Webster, 20.6; Fort Pembina, 16.6; Rapid City, 15.5; Deadwood, about 12; Morrilton, 9; Bismarck, 5.8.

*District of Columbia.*—Washington City, 5.7.

*Delaware.*—Saint George's, 12.

*Illinois.*—Springfield, 13.8; Mattoon, 7.1; Rockford, 7.1; Polo, 6; Bunker Hill, 5.2; Riley, 5.

*Indiana.*—Indianapolis, 8.8; Logansport, 7.2.

*Iowa.*—Independence, 17.5; Dubuque, about 13; Monticello, 8.1; Muscatine, 7; Fort Madison, 6.7; Cedar Rapids, 6.5; Davenport, 5.3.

*Kentucky.*—Bowling Green, 6.

*Maine.*—Cornish, 27; Gardiner, 23; Orono, 22.5; Eastport, about 15.

*Maryland.*—Fallston, 7.5; Cumberland, 6.

*Massachusetts.*—Provincetown, 17.7; Rowe, 16; Worcester, 15.2; Boston, 15; Westborough, 10.5; Taunton, 10.3; Princeton, 9.4; Milton, 8; Somerset, 6.5; Fall River, 6.

*Michigan.*—Thornville, 9.5; Ionia, 8.2; Grand Haven, 6.2; Swartz Creek, 6.1; Northport, 5.8; Grand Rapids, 5.5; Mottville, 5.5; Manistique, 4.2.

*Minnesota.*—Duluth, 9.4; Chester, 6; Saint Paul, 5.

*Montana.*—Fort Ellis, 8.2; Fort Custer, 7; Helena, 5.9; Fort Maginnis, 5.6; Fort Assinaboine, 5.3.

*Nebraska.*—Omaha, 10.5; Fort Niobrara, 9.4; Red Willow, 6; Genoa, 5.

*Nevada.*—Halleck, 14.5; Elko, 13; Otego, 11; Winnemucca, 11; Wells, 7.5; Toano, 6.5; Golconda, 6.1; Carson City, 5.1; Beowawe, 5; Tecoma, 4.

*New Hampshire.*—Woodstock, 32.2; Ashland, 30.6; Wolfeborough, 28.5; Bristol, 28; Grafton, 28; Lake Village, 27.2; Belmont, 22; Mount Washington, 16.7.

*New Jersey.*—Cape May, about 10; Little Egg Harbor, 5.4.

*New York.*—Dannemora, 67.2; Plattsburg Barracks, 25.7; Palermo, 16; Oswego, about 15; Syracuse, about 15; Fort Hamilton, 14.3; Menand station (near Albany), 14.1; Coopers-town, 13.5; Penn Yan, 11.4; Madison Barracks, 9.5; White

Plains, 9; Auburn, 8.5; Ithaca, 8.5; Albany, about 8; Humphrey, 7; Factoryville, 6; Mountainville, 6; Port Jervis, 6.

*North Carolina.*—Ogreeta, 6; Highlands, 5.

*Ohio.*—North Lewisburg, 9; College Hill, 6.5; Jacksonburg, 6; Canal Dover, 5.

*Pennsylvania.*—Troy, 9; Leetsdale, 8.6; Easton, 8.5; Germantown, 8.5; Grampian Hills, 8; Fallsington, 7.8; Catawissa, 7.7; Dyberry, 7; West Chester, 6.5; Haverford College, 6; Drifton, 5.5.

*Tennessee.*—Knoxville, 5.

*Utah.*—Salt Lake City, 32; Kelton, 14; Corrinne, 9.5; Terrace, 8.5; Ogden, 7.9; Nephi, 6.5; Promontory, 6.5.

*Vermont.*—Strafford, 34; Burlington, 33; Lunenburg, 31; Newport, 27.2; Randolph, 27; Woodstock, 25.5; Charlotte, 20; Dorset, 16.5.

*Virginia.*—Accotink, 6.1; Marion, 5.

*Washington Territory.*—Pleasant Grove, 5.

*West Virginia.*—Wellsburg, 4.

*Wisconsin.*—Milwaukee, 17; Sussex, 14.8; Madison, 10.3; Embarrass, 9; Lancaster, 8.2; Beloit, 6.3; Neillsville, 5.9.

#### DEPTH OF UNMELTED SNOW ON GROUND AT END OF MONTH.

[Expressed in inches and tenths.]

*California.*—Hydesville, trace.

*Colorado.*—Pike's Peak, 36; Gunnison, 8; Denver, 0.5.

*Connecticut.*—Bethel, trace.

*Dakota.*—Deadwood, 5.

*Iowa.*—Manchester, in drifts.

*Maine.*—Gardiner, 16; Eastport and Portland, trace.

*Massachusetts.*—Rowe, 24 (?); Milton, 2; Princeton, Somerset, and Westborough, trace.

*Michigan.*—Northport, 12; Manistique, 6; Grand Haven, trace; Traverse City, scattering drifts.

*Minnesota.*—Saint Vincent, 2; Moorhead, trace.

*Montana.*—Fort Maginnis, trace.

*New Hampshire.*—Mount Washington, 36; Grafton, trace.

*New York.*—Dannemora and North Volney, in drifts; Ithaca, Oswego, and Palermo, trace.

*Pennsylvania.*—Dyberry, in drifts.

*Utah.*—Nephi, 1.

*Vermont.*—Strafford, 30; Woodstock, 12; Burlington, 2; Charlotte, in drifts; Dorset, trace.

*Wisconsin.*—Embarrass and Wausau, trace.

*Wyoming.*—Cheyenne, 4.

#### SLEET.

Sleet occurred during March in the various districts, as follows.

*New England.*—6th to 9th, 15th, 19th, 20th, 24th.

*Middle Atlantic states.*—7th to 9th, 13th, 19th.

*South Atlantic states.*—Charlotte, North Carolina, 4th; Atlanta, Georgia, 4th, 5th.

*Western Gulf states.*—Little Rock, Arkansas, 7th, damaging trees and telegraph lines; Fayetteville, Arkansas, 7th; Fort Smith, Arkansas, 8th; Lead Hill, Arkansas, 7th, 8th.

*Tennessee.*—Chattanooga, 4th, 5th; Milan, 5th.

*Ohio valley.*—5th to 10th, 31st.

*Lower lake region.*—8th to 11th, 19th, 20th, 31st.

*Upper lake region.*—Escanaba, Michigan, 11th, 31st.

*Upper Mississippi valley.*—5th, 7th, 8th.

*Missouri valley.*—Fort Scott, Kansas, 7th; Fort Sully, Dakota, 12th; Webster and Morrilton, Dakota, 22d.

*Northern slope.*—4th, 5th, 21st.

*Middle slope.*—Yates Centre, Kansas, 5th; Dodge City, Kansas, 17th.

*Southern plateau.*—Fort Grant, Arizona, 23d.

*Middle plateau.*—Salt Lake City, Utah, 31st.

*Northern plateau.*—Boisé City, Idaho, 7th, 10th, 12th.

#### HAIL.

Dalton, Whitfield county, Georgia: a heavy hail storm occurred at about 7 p. m. of the 7th, the hailstones being as large as hens' eggs.

Nokomis, Montgomery county, Illinois: a violent hail storm occurred in this vicinity on the afternoon of the 11th, the hailstones being of very large size.

Knoxville, Tennessee: at 2.50 p. m. of the 25th a violent rain and hail storm, lasting twenty-six minutes, passed over this city from the west. Hail fell for eighteen minutes, some of the stones measuring three inches in length and one and one-half inches in thickness. They were generally star-shaped, with very rough surface. This storm was followed during the evening by two others, the first occurring at 5.05 p. m., and the second at 9.50 p. m. Both of these were accompanied by hail. Nearly all window-glass of western exposure in the city was broken. During the storm occurring between 5 and 6 p. m. the wind reached a velocity of forty-eight miles. In northern Knoxville four small buildings were blown down and the roofing was blown from several others. The crops and fruit in the tracks of the storms were severely damaged. The widths of the paths of these three storms were one-half mile, three and one-half miles, and three-fourths mile, respectively.

Athens, McMinn county, Tennessee: a severe hail and wind storm occurred on the 25th, causing considerable damage.

Cleveland, Bradley county, Tennessee: one of the most violent hail storms ever known here occurred on the evening of the 25th. All of the hot-houses and skylights in this vicinity were completely ruined by the hailstones, which were of unusual size.

Cartersville, Parker county, Tennessee: a severe hail storm occurred at Rodgers, four miles distant, on the afternoon of the 25th. The hailstones were of very large size, and fell in sufficient quantity to entirely cover the ground.

Nashville, Tennessee: a violent hail storm occurred at 7.50 a. m. of the 25th. Great damage was done to hot-houses and windows. The storm was accompanied by high winds and very heavy rain.

Bremer, Haralson county, Georgia: at 3.30 p. m. of the 25th a heavy fall of hail occurred.

Ogreeta, Cherokee county, North Carolina: a violent hail storm occurred on the 25th, lasting thirty minutes—from 7.30 to 8.00 p. m. The storm passed in a direction from southwest to northeast. The hailstones were very large, some weighing as much as one pound, and fell with such force as to be driven into the earth to a depth of several inches. Much damage was done to vegetation and stock.

Thomson, McDuffie county, Georgia: a violent rain and hail storm passed through this county on the night of the 26th. The hailstones were very large, and in some places covered the ground to a depth of more than two inches. Much fencing and timber were blown down.

Hail storms of less severity than those above mentioned occurred in the several states and territories as follows:

*Arkansas.*—Lead Hill, 11th, 27th.

*Arizona.*—Wickenburg, 26th, 29th, 30th; Prescott, 6th, 10th, 23d, 26th; Forts Grant and McDowell, 6th; Fort Apache, 6th, 16th.

*California.*—Hydesville, 9th, 10th, 22d, 23d; College City, 22d, 24th; Oakland and Angel Island, 25th; Sacramento, 26th; Benicia Barracks and Red Bluff, 27th; San Francisco, 25th, 27th, 28th; Cape Mendocino, 10th, 26th, Fall Brook, 29th.

*Colorado.*—West Las Animas, 27th.

*Dakota.*—Fort Sully, 12th.

*Florida.*—Saint Augustine, 9th.

*Illinois.*—Anna, 6th, 7th, 11th; Mattoon, 28th; Swanwick, 11th, 25th.

*Indiana.*—Wabash, Jeffersonville, Sunman and Indianapolis, 25th; Griffin Station, 7th, 25th.

*Indian Territory.*—Cantonment, 23d.

*Iowa.*—Independence, 27th, 31st; Humboldt, 10th; Ottumwa, 23d, 29th; Keokuk, 25th.

*Kansas.*—Topeka and Wyandotte, 24th; Fort Scott, 24th, 31st; Allison, 10th, 27th; West Leavenworth, 21st; Manhattan, 25th, Mand, 31st, Sherlock, 28th.

*Kentucky.*—Louisville, 25th.

**Louisiana.**—New Orleans, 17th.  
**Maryland.**—Emmitsburg, 8th; Fort McHenry, 14th; Ocean City, 13th, 26th.  
**Massachusetts.**—Westborough and Heath, 8th; Rowe, 8th, 11th; Provincetown, 20th.  
**Michigan.**—Kalamazoo and Northport, 31st.  
**Minnesota.**—Duluth, 22d; Hastings, 30th.  
**Missouri.**—Jefferson Barracks, 7th; Curryville, 24th.  
**Nebraska.**—Crete and Marquette, 21st.  
**Nevada.**—Fort McDermitt, 21st.  
**New Jersey.**—Newark, 8th, 9th, 26th.  
**New Mexico.**—Fort Union, 15th, 23d, 31st.  
**New York.**—Factoryville, 7th; Humphrey, 8th; Oswego and Syracuse, 11th.  
**North Carolina.**—Weldon, 9th; Highlands, 11th; Chapel Hill, Ogreeta, Statesville, Scott's Hill, and Wilmington, 25th; Hatteras and Wash Woods, 29th.  
**Ohio.**—College Hill, 5th, 25th; Jacksonburg, 18th, 25th; Cincinnati, 25th.  
**Oregon.**—Portland, 10th; Astoria, 10th, 19th; Roseburg, 26th.  
**Pennsylvania.**—Dyberry, 9th.  
**Tennessee.**—Ashwood, 19th, 25th; Austin, 25th.  
**Texas.**—Indianola, 12th; Galveston, 13th.  
**Utah.**—Salt Lake City, 5th, 6th; Nephi, 7th, 10th.  
**Virginia.**—Norfolk, 13th; Wytheville, 19th; Variety Mills, 25th; Chincoteague, 26th.  
**Wisconsin.**—Evansville and Sussex, 30th; Manitowoc 31st.  
**Washington Territory.**—Dayton, 12th.

## WINDS.

The most frequent directions of the wind during March, 1884, are shown on chart iii. by arrows flying with the wind. In the Missouri valley, New England, and the middle Atlantic states, they were from north to west; in the south Atlantic and Gulf states, from southeast to southwest; in the lake region and upper Mississippi valley, variable; on the Pacific coast, from west to northwest.

## TOTAL MOVEMENTS OF THE AIR.

[In miles.]

In the following table are given the stations reporting the largest and smallest total movements of the air in each of the various districts:

Districts.	Stations reporting largest.	Miles.	Stations reporting smallest.	Miles.
New England.....	Block Island, R. I.....	11,733	New London, Conn.....	6 139
Middle Atlantic states.....	Delaware Breakwater.....	12,976	Lynchburg, Va.....	3,446
South Atlantic states.....	Fort Macon, N. C.....	11,625	Augusta, Ga.....	3,341
Florida peninsula.....	Key West.....	7,919	Sanford.....	5,451
Eastern Gulf states.....	Pensacola, Fla.....	6,552	Montgomery, Ala.....	5,061
Western Gulf states.....	Indianola, Tex.....	10,737	Little Rock, Ark.....	4,753
Rio Grande valley.....	Brownsville, Tex.....	8,165	Rio Grande City.....	5,838
Tennessee.....	Chattanooga.....	5,766	Memphis.....	4,550
Ohio valley.....	Louisville, Ky.....	6,619	Cincinnati, Ohio.....	4,682
Lower lake region.....	Sandusky, Ohio.....	9,693	Toledo, Ohio.....	5,620
Upper lake region.....	Milwaukee, Wis.....	9,260	Duluth, Minn.....	5,179
Extreme northwest.....	Fort Buford, Dak.....	6,282	Saint Vincent, Minn.....	4,659
Upper Mississippi valley.....	Saint Louis, Mo.....	9,961	Dubuque, Iowa.....	4,132
Missouri valley.....	Leavenworth, Kans.....	6,822	Omaha, Nebr.....	5,819
Northern slope.....	Cheyenne, Wyo.....	9,974	Helena, Mont.....	3,625
Middle slope.....	Dodge City, Kan.....	12,316	Denver, Colo.....	5,732
Southern slope.....	Fort Concho, Tex.....	8,658	Fort Davis, Tex.....	7,064
Southern plateau.....	Fort Apache, Ariz.....	5,335	El Paso, Tex.....	3,981
North Pacific coast region.....	Fort Canby, Wash. T.....	5,710	Olympia, Wash. T.....	1,559
Middle Pacific coast region.....	San Francisco, Cal.....	6,998	Red Bluff, Cal.....	4,974
South Pacific coast region.....	Los Angeles, Cal.....	5,681	Yuma, Ariz.....	4,394

On the summit of Mount Washington, New Hampshire, and Pike's Peak, Colorado, the total movements of the air were 24,525 and 19,128 miles, respectively, the record of the first-named station being incomplete on account of frost work. At Salt Lake City, Utah, the total movement of the air was 4,662 miles.

## HIGH WINDS.

On the summit of Pike's Peak, Colorado, the highest wind velocities were: 72 w., 4th and 9th, and 112 sw., 26th; other dates on which velocities of fifty or more miles per hour were

recorded are as follows: 3d, 5th, 7th, 10th, 11th, 12th, 15th, 21st, 23d, 25th, 26th, 27th, 31st.

At Cape Mendocino, California, the following high velocities were recorded: 72 se., 8th; 92 ne., 9th; 56 se., 13th; 54 se., 14th; 72 se., 27th; the record covered only portions of the month, viz.: from 7th to 17th, 20th, 21st, 22d, and from 27th to 31st.

On the summit of Mount Washington, New Hampshire, the highest wind velocities were 100 nw., 4th; 114 n., 10th; 90 sw., 11th; 122 sw., 12th; 80 nw., 13th; 80 w., 14th; 80 nw., 22d; 85 s., 23d; 82 se., 26th; 88 nw., 30th. Other dates on which velocities of fifty or more miles per hour were recorded are as follows: 3d, 5th, 6th, 7th, 15th, 16th, 17th, 18th, 25th, 29th, 31st.

Other stations reporting velocities of 50 or more miles per hour, are as follows:

Cape May, New Jersey, 60, w., 3d; 52, nw., 10th; 72, nw., 30th; 60, nw., 31st.

Fort Elliott, Texas, 60, s., 10th; 68, sw., 27th.

Sandy Hook, New Jersey, 61, nw., 30th; 52, nw., 31st.

Buffalo, New York, 60, sw., 12th.

Cheyenne, Wyoming, 57, nw., 27th.

Dodge City, Kansas, 56, sw., 10th.

Delaware Breakwater, Delaware, 56, nw., 30th.

Erie, Pennsylvania, 55, s., 11th.

Denver, Colorado, 54, w., 27th.

Cape Henry, Virginia, 52, nw., 31st.

Fort Maginnis, Montana, 52, nw., 10th.

Port Huron, Michigan, 50, w., 12th.

## LOCAL STORMS.

Below are given brief descriptions of the local storms reported from the several states during March, 1884. The most severe storms of this character were those occurring in the Ohio valley and Southern states on the 25th, during the passage of low area xi.:

**Alabama.**—Guntersville, Marshall county: during the night of the 12-13th, a violent storm occurred four or five miles southeast of this place. The course of the storm was slightly north of east, and its path was about one-half mile wide. About thirty buildings were blown down and two persons killed and several injured.

Clayton, Barbour county: a severe storm passed through the northern outskirts of this town on the 25th. Its course was from southwest to northeast, and the path about one-fourth mile in width. Many cabins and out-buildings were destroyed and other damage done.

**Colorado.**—Denver: about fifty buildings in this city were unroofed by the storm of the 27th, entailing losses aggregating about \$15,000. The storm began at 9.30 p. m. and continued until after midnight, the wind reaching a velocity of fifty-four miles per hour from the west.

**Connecticut.**—New Haven: a severe gale occurred on the 30th, causing considerable damage to shipping.

New London: a dangerous off-shore gale prevailed on the 30th. Numerous vessels arrived in disabled condition.

**Delaware.**—Delaware Breakwater: during a gale on the 14th a wind velocity of forty-seven miles was recorded. On the 30th the wind reached a velocity of fifty-six miles from northwest. During this storm the schooner "Riverdale" capsized and drifted seaward; and the schooners "Mattie Holmes," "Annie M. Reynolds," and "Charles H. Hodgdon" went ashore. The sloop "Potosi" was entirely dismasted.

**Georgia.**—Macon, Bibb county: a violent storm passed over the northeastern part of this state on the 25th, destroying many buildings and causing loss of life.

Gainesville, Hall county: at about 2 p. m. of the 25th, a destructive storm passed over this place coming from the southwest, wrecking numerous buildings and levelling trees, etc., in its course. The tornado cloud was cone-shaped and entered Hall county near the confluence of the Chertatee and Chattahoochee rivers.